CROSS STEP MOVING ON FOUR SPOT TEST VALIDITY AND IT IS RELATION WITH FALL RELATED PHYSICAL FUNCTION IN STROKE PATIENTS - A CROSS SECTIONAL STUDY

Dissertation submitted in

the Partial fulfillment

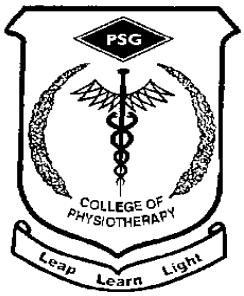
for the degree of

MASTER OF PHYSIOTHERAPY

(Neurology)

The Tamil Nadu Dr. M.G.R. Medical University

Chennai



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CERTIFICATE

This is to certify that the research work entitled **"CROSS STEP MOVING ON FOUR SPOT TEST – VALIDITY AND IT IS RELATION WITH FALL RELATED PHYSICAL FUNCTIONS IN STROKE PATIENTS – A CROSS SECTIONAL STUDY"** was carried out by **SATHIYARAJI.D, REG. No. 271620243,** of P.S.G. College of Physiotherapy, towards the partial fulfilment for the degree of **MASTER OF PHYSIOTHERAPY (Physiotherapy in Neurology),** affiliated to The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

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ABBREVIATIONS

CSFT	-	Cross step moving on four spot
BBS	-	Berg balance scale
FRT	-	Functional reach test
TIS	-	Trunk Impairment Scale
FMLEIS	-	fugal Meyer lower extremity impairment scale
TUGT	-	time up and go test
MMSE	-	Mini Mental Status Examination
ROC	-	Receiver operating characteristics

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LIST OF ANNEXURES

CHAPTER – I

INTRODUCTION

Stroke is a disorder in which the arteries to the brain become blocked or rupture, resulting in death of brain tissue. According to the world health organization (WHO) it is a clinical syndrome consisting of rapidly developing signs of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin. It usually occurs among men aging 60-70 years and young as 30-40 years old because of the change in lifestyle.[1]

Falls are more common in people with stroke, who fall 1.5 to 2 times than the age matched older population without stroke. After stroke people commonly have physical, cognitive and psychological impairments, which can increase their propensity to fall. Other impairments are poor balance, visual neglect, and sensory loss. Increased muscle tone, decreased muscle strength, and leads to fear of falling. Falls can result in serious consequences (fractures) which in people with stroke compared with age-matched healthy adults. Other sequences of falls in the post stroke populations may include fear of falling and reduced confidence in mobility, which can have debilitating effects on the everyday life of people with stroke.[1, 2]

The increased risk of falling, people with stroke have decreased mobility levels. Decreased mobility in this population because of reduced independence in activities of daily living, lower health quality of life, sedentary lifestyles, muscle atrophy, weakness, and bone loss, particularly in the hemi paretic lower limb.[3] It is important to investigate the falls and mobility levels because people with have increased risk of falling and decreased mobility levels with subsequent determinate effects. Therefore the first 12 months after rehabilitation is an important time period, because the falls are common in throughout this period.[4,]

A disproportionate number of stroke patients, as many as 48%, fall during inpatient rehabilitation of these falls nearly one third lead to potentially serious injuries. Hospital related falls are associated with long length of stay and poor outcomes as well as reduced physical activity owing to fear of additional falls and diminished dignity to prevent these negative outcomes preventive strategies are needed for patients at high risk of falls.[5] General

characteristics (e.g use of antihypertensive, anti-anxiety, antidepressant medications, urinary incontinence, history of previous falls) to indicate fall risk however these characteristics may be less relevant to fall risk after stroke specific disabilities and impairments[8, 9].

The harm risk screen is a three items scale that asses three levels of fall risk (low, medium, high) based on patient functional ability, history of falls, and clinical judgement of fall risk . so the fall harm risk scale is used for all patients throughout the healthy populations. Stroke assessment fall risk scale using clinical documentation from first 72 hours of the inpatient rehabilitation admission. These comprise four impairments (impulsivity, hemi neglect, static and dynamic balance) and three functional limitations (transfer, problem solving and memory. Like many patients fall risk scores such as, Morse scale, hand rich two scales etc. In stroke rehabilitation every patient scores at high fall risk one these tools yet not every patients will fall. Preventive strategies may be initiated for reducing the vigilance provided to these truly at risk.[4, 10]

There are number of fall risk assessment tools available with some evidence, to support their use in predicting risk of fall. If the purpose is to screen for high risk populations ,a tool is need that is guide and easy to apply , yet has good sensitivity and specificity, tools needs to reliably identify remediable risk factors on which intervention can be focused. Five minutes' walk, the five step test and functional reach test , mobility fall chart, fall risk assessment ,STRATIFY tools were tested in acute care settings. Four of these studies were conducted in community settings on following five tools are, CTSIB, floor transfer, five minutes' walk, functional reach and maximum step length. **Jane Smith, et al.,**

Other studies supportive in house setting found good predictive validity for the BERGBALANCE SCALE, physiological and clinical predictor tools, ellipse of postural sway and tinetti balance subscale. Generalization of findings is further limited by, cognitive impairments, limited to recurrent fallers, specific to one gender or tests the tools on small samples.

1.1 NEED OF THE STUDY:

The **CROSS STEP MOVING ON FOUR SPOT TEST** used in geriatrics and studies have shown that it is a reliable and valid test to identify the fall risk in elderly populations. This test is not yet used in stroke population for the same purpose. Therefore there is need to do a study to find its validity as well as to find what are the impairments post stroke are related to this test to identify fall risk **.**there are many validity scales and test are to identifying the fall risk in stroke patients but cross step moving on four spot test is a additional new test to identifying fall risk in stroke patients for futures studies.

1.2 OBJECTIVES:

- To find the validity of Cross step moving on four spot test.
- To find the relation between cross step moving on four spot test and fall related physical function.
- To find the cut off score to identifying fall risk in stroke patients using cross step moving on spot test and time up and go test.

1.3 HYPOTHESIS:

NULL HYPOTHEISIS:

There is no relation between cross step moving on four spot test and fall related physical. There is no correlation between cross step moving on four spot test and time up and go test

ALTERNATE HYPOTHESIS:

There is a relation between cross step moving on four spot test and fall related physical function. There is a correlation between cross step moving on four spot test and berg balance scale

1.4 OPERATIONAL DEFINITIONS:

Balance: -Refers to individual ability to maintain the line of gravity within the base of support

Trunk impairment scale: The trunk impairment scale is used to measure the motor impairment of the trunk after a stroke through the evaluation of static and dynamic sitting balance as well as co-ordination of trunk movement.

CHAPTER-II

REVIEW OF LITERATURE

- **Demurashini et al., (2013)** concluded the trail to trail reliability test indicated good reliability of the CSFT in both sexes (interclass correlation coefficient=0.833 in men , o.825in women). However, trail to trail errors increased with increase in the CSFT values in both sexes. Significant correlations were observed between the CSFT values and scores for most fall related physical function test in both sexes.

- **K. Berg et al., (1995)** conducted a study to asses the reliability of berg balance scale the result showed that there was excellent inter-rater and intra-rater reliability with ICCs=0.98 and 0.97 respectively.

- **Noriaki Maed. A et al (2015)** conducted a study discriminate analysis for predictor of falls in stroke , to examine factors that may aid in the prediction of the likelihood of falls in stroke patient .A total of 53 stroke patients (30 male, 23 female) aged 67.0 ± 11.1 years were interviewed regarding their fall history. Physical performance was assessed using the Berg Balance Scale (BBS) . Discriminate analysis for predicting falls in stroke patients showed that admission BBS score was significantly related to the likelihood of falls. Moreover, discriminate analysis showed that the use of a significant BBS score to classify fallers and non-fallers had an accuracy of 81.1%. The discriminating criterion between the two groups was a score of 31 points on the BBS. Results of this study suggest that BBS score is a strong predictor of falls in stroke patients.

- **Pao-Tsai Cheng, et al., (1998)** a study conducted a study on Sit-to-Stand Movement in Stroke Patients and Its Correlation With Falling , To use kinetic assessment of the sit-to-stand movement as a stroke patients at risk for falling. Thirty-three stroke patients (18 fallers, 15 non fallers) and 25 age-matched healthy subjects were included in this study. The rate of rise in force (dF/dT) was significantly lower in stroke fallers than in stroke non fallers and health subjects (23.78 2 17.38, 55.23 t 31.24, and 85.96 ‘- 42.4

percent body weight per second, respectively [p < .OO5]). The centre of pressure sway in medio- lateral direction during rising/sitting down was much greater in stroke fallers than in stroke non fallers or healthy subjects (p < .05). Body weight distribution was asymmetric on the feet of stroke patients, with much more body weight on their sound side. The significantly lower rate of rise in force and greater postural sway while rising/sitting down may be useful indentifying stroke patients who are at risk for falling.

- **Terry P Breising, et al., (2008)** conducted study on stroke assessment of fall risk predictive validity in inpatient stroke rehabilitation. To evaluate relative accuracy of a newly developed Stroke Assessment of Fall Risk (SAFR) for classifying fallers and non-fallers, compared with a health system fall risk screening tool, the Fall Harm Risk Screen .Patients admitted for inpatient stroke rehabilitation (N = 419) with imaging or clinical evidence of ischemic or hemorrhagic stroke .A total of 68 (16%) participants fell at least once. The SAFR was significantly more accurate than the Fall Harm Risk Screen (p < 0.001), with area under the curve of 0.73, positive predictive value of 0.29, and negative predictive value of 0.94. For the Fall Harm Risk Screen, area under the curve was 0.56, positive predictive value was 0.19, and negative predictive value was 0.86. Sensitivity and specificity of the SAFR (0.78 and 0.63, respectively) was higher than the Fall Harm Risk Screen (0.57 and 0.48, respectively).

- **Ashburn, et al., (2008**) conducted study on Predicting people with stroke at risk of falls to identify, at discharge from hospital, those who are most at risk of repeated falls. 122 participants (mean age 70.2 years) were recruited. Fall status at 12 months was available for 115 participants and of those, 63 [55%; 95% confidence interval (CI) 46–64] experienced one or more falls, 48 (42%; 95% CI 33–51) experienced repeated falls, and 62 (54%) experienced near-falls. All variables available at discharge were screened as potential predictors of falling. Six variables emerged [near-falling in hospital, River mead leg and trunk score, River mead upper limb score, Berg Balance score, mean functional reach, and the Nottingham extended activities of daily living (NEADL) score]. A score of near-falls in hospital and upper limb function was the best predictor with 70% specificity and 60% sensitivity.

- **Jane smith et al., (2006)** conducted a study on use of the 'STRATIFY' falls risk assessment inpatients recovering from acute stroke to investigate the predictive validity and reliability of the STRATIFY falls risk assessment tool387 patients admitted to the participating units during the study period, 225 contributed to the 28 day inpatient study, and 234 were followed up at 3 months after discharge. STRATIFY performed poorly in predicting falls in the first 28 days (sensitivity 11.3% and specificity 89.5%) and after discharge (sensitivity 16.3% and specificity 86.4%). Agreement was 'fair' between baseline and discharge scores (kappa = 0.263) and 'good' between the pre-hospital discharge score and that obtained in the week preceding discharge (kappa = 0.639).STRATIFY performed poorly as a predictor of falls in a heterogeneous population of stroke patients. There is a need for a disease-specific rather than a generic falls risk assessment tool.

- **N.Maeda, et al., (2009)** conducted study on Predicting the Probability fall Incidence in Stroke Patients Using the Berg Balance Scale investigated the relationship between balance, mobility and falls in 72hemiplegic stroke inpatients, with the aim of developing a model for predicting fall risk. Balance was assessed using the Berg Balance Scale (BBS) and activities of daily living were evaluated using the Functional Independence Measure (FIM). Fallers (occasional and repeat; n = 27) had a shorter time from stroke onset, lower FIM scores on admission and discharge, lower BBS and Mini-Mental State Examination scores, a greater age and longer length of hospital stay compared with non-fallers (all differences were significant).

- A logistic model for predicting falls showed that BBS at admission was significantly related to falls, with fallers having lower BBS scores at admission (cut-off $\leq$ 29; sensitivity 80%; specificity 78%). These data suggest BBS is a sensitive and specific measure for identifying stroke patients at risk of falling.

- **Cahit Ugur, et al., (2000)** conducted study on Characteristics of falling in patients with stroke to identify the risk factors for falling after stroke, to establish the relation with lesion localization, and to evaluate the incidence of falling. The falling history and the mood of 293 patients with stroke were investigated by a standard questionnaire. The

result shows that Increasing age, depression, and heart disease were significant risk factors for falling (heart disease had a negative influence). A right hemispheric infarct was significantly more common among the falling group.

- **Seung Heon An, et al., (2014)** conducted a study on Validity of the Performance-Oriented Mobility Assessment in Predicting Fall of Stroke investigated the usability of the performance-oriented mobility assessment(POMA) for predicting falls in stroke patients. The POMA examines the level of balance and mobility. Data were collected on the number of falls and physical functions from 72 stroke survivors the result shows that accuracy of the POMA balance subscale was moderate, the cut off value used for predicting falls was 12.5points (sensitivity: 72%; specificity: 74%), and the area under the curve was 0.78 (95% confidence interval:0.66-0.91, $p < 0.001$). When comparing the physical functions (i.e., OLS, STS, 10WT, FM, and TIS) to the cut off value for the POMA balance subscale, the physical functions of the group over 12.5 points for the subscale were significantly higher than those in the group below 12.5 points ($p < 0.05$). The muscle strength shown in the STS was the most important factor affecting the performance in the POMA balance subscale ($\beta = -0.447$). For the group below 12.5 points on the POMA balance subscale, the risk of falling increased by 0.304 times more than the group over 12.5 points. The POMA balance subscale is a valid tool for assessing the physical function and fall risk of stroke

- **Efraim Aizen et al.,** (**2012)** conducted study on Prediction of falls in rehabilitation and acute care geriatric setting to examine the feasibility to develop an efficient and applicable geriatric hospital-specific fall risk-prediction tool. In total, 1013 patients aged over 65 years were admitted during a 6-month period. Fourteen patient characteristics found in previous studies to be risk factors for falls were tested for predictive validity. The result shows that. Dementia ($p < 0.001$) and delirium (p ¼ 0.005) predicted falls in patients hospitalized for rehabilitation. In the multivariate model, only dementia was a significant predictor in these patients, (p ¼ 0.014), while delirium only approached significance. Being hospitalized for rehabilitation after arthroplasty was a negative predictive factor of falls (p ¼ 0.022). Among acute care patients, only being operated on

in the past for joint arthroplasty (p ¼ 0.035) predicted falls in the multivariate model, while using a wheelchair was a negative predictive factor (p ¼ 0.023). The current study reveals a poor predictive value for falls for most patient characteristics(except delirium and dementia) in elderly hospitalized patients, illustrating the incertitude of developing and using predictive falls tools based on such characteristics in hospitalized elderly patients

- **Mary Elizabeth Walsh et al., (2016)** conducted a study on systemic review of risk prediction models for falls after stroke. To identify, critically appraise, and summarize risk prediction models for the occurrence of falling after stroke . .the result shows that The 12 included articles presented 18 risk prediction models. Seven studies predicted falls among inpatients only and five recorded falls in the community. Methodological quality was variable. A C-statistic was reported for seven models and values ranged from 0.62 to 0.87. Models for use in the inpatient setting most frequently included measures of hemi-inattention, while those predicting community events included falls (or near-falls) history and balance measures most commonly. Only two studies reported any form of validation and none presented a validated model with acceptable performance.

CHAPTER- III

MATERIALS AND METHOD

3.1 MATERIALS:

- A wooden chair of 43cms of height
- Inch tape
- Bed
- Stop watch
- Cross step moving on four spot test chart

3.2 STUDY DESIGN:

Cross sectional study

3.3 STUDY SETTING:

Department of neurology and department of PMR in stroke rehabilitation centre, PSG hospitals, Coimbatore.

3.4 HUMAN PARTICIPATION PROTECTION

The study was reviewed and approved by Institutional Human Ethics Committee, PSG IMS&R.

3.5 POPULATIONS AND PARTICIPANTS:

Participants with hemiparesis from PSG IMS&R Hospitals were chosen as population for the study. A total of 30 hemi paretic participants were included in the study

3.6 CRITERIA FOR SAMPLE COLLECTION:

3.6.1 Inclusion Criteria:

- First episode of thrombotic stroke
- Age 40 to 50 years patients
- Medically stable patients

- Able to follow verbal commands
- Mini mental score examination score>23
- Patient who are walking without walking aids
- Patient who are able to complete the test.

3.6.2 Exclusion Criteria:

- Vestibular dysfunction
- Visual problems that will affect walking
- Other neurological and orthopaedic conditions that will affect walking**.**

3.7 INTERVENTION:

Not applicable.

3.8 SAMPLING:

Convenience Sampling

3.9 STUDY DURATION:

10 months.

3.10 OUTCOME MEASURES:

- Cross step moving on four spot test: time taken to complete the task.
- Berg balance scale
- Timed up and go test
- Fugal Meyer lower extremity motor impairment scale
- Trunk impairment scale
- Functional reach test
- Romberg test

3.11 TECHNIQUE OF DATA COLLECTION:

Patient will be assessed for eligibility based on the inclusion and exclusion criteria. The informed consent will be obtained from the eligible patient. Each patient will be tested with all the outcome measures used in this study in random order. Adequate rest period will be given between the tests. Data will be collected and analysed.

3.12 TECHNIQUE OF DATA ANALYSIS AND INTERPRETAION

Data collected from subjects were analyzed using Pearson correlation coefficient was used to measure the relationship between the cross step moving on four spot test and fall related physical function. ROC curve was used to measure the cut off score to identifying fall risk in stroke patients using cross step moving on spot test and time up and go test in stroke patients**.** All these statistical analysis was done using SPSS 16.O

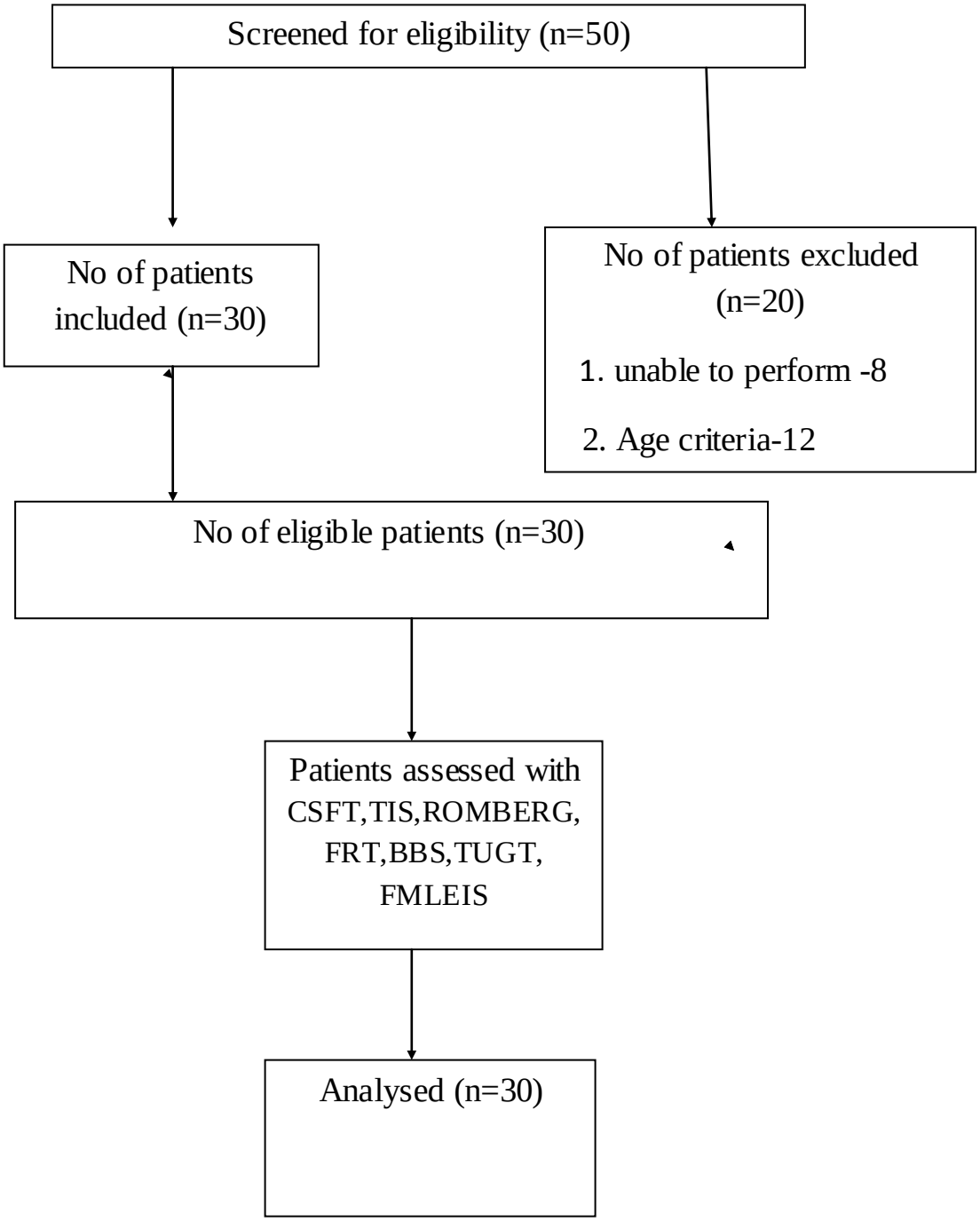
CHAPTER – IV

DATA ANALAYSIS AND INTERPRETATION

Data analysis is the systemic organization and synthesis of research data and testing of research hypothesis using these data. Interpretation is the process of making sense of the results of a study and examining the implication. stroke patients were tested with cross step moving on four spot test and stroke patients were assessed with trunk impairment scale, time up and go test, berg balance scale , Romberg test, functional reach test, fugl-meyer lower extremity impairment scale additionally.

The **Pearson Correlation Coefficient** 'r' value is used to measure the strength of relationship between the cross step moving on four spot test and fall related physical function. ROC curve was used to measure the cut off score to identifying fall risk in stroke patients using cross step moving on spot test and time up and go test in stroke patients

SCHEMATIC REPRESENTATION OF FLOW OF PARTICIPANTS



COLLECTED DATA

TABLE-1

Cross step moving on Four Spot Test, Trunk Impairment Scale, Romberg test, functional reach test, Fugal Meyer Lower Extremity impairment scale, Berg Balance Scale, time up go test values of stroke subjects (NO=30)

S.NO	CSFT	BBS	FMLEIS	FRT	ROMBERG TEST	TIS	TUGT
1	28	47	29	12	5	17	14
2	20.5	45	29	11	60	22	19
3	14.5	52	25	10	60	23	15
4	20.5	44	21	12	60	13	20
5	20.5	44	21	12	60	13	20
6	19	52	34	12	60	21	14
7	24.1	55	32	9	60	20	22
8	21	46	34	12	60	17	14
9	23	47	30	11	60	23	11
10	11.5	47	25	11	60	12	12
11	19	44	29	12	60	23	10
12	11	56	34	12	60	23	11
13	12	53	34	12	60	23	11
14	18	52	31	11	60	23	13
15	19.5	51	32	14	60	21	12
16	12	53	34	12	60	16	11

17	16.5	53	34	12	60	23	11
18	19	51	31	12	40	19	12
19	9	53	34	14	60	22	9
20	11.5	50	34	13	60	21	10
21	14	52	34	12	60	23	13
22	18.5	52	34	14	60	20	10
23	12	53	34	14	60	23	11
24	15	54	34	14	60	22	10
25	17.5	51	32	14	60	21	9
26	16.5	53	33	11.5	60	23	13
27	9.5	52	32	15	60	21	9
28	22	54	26	15	60	19	10
29	25.5	53	28	12	30	21	11
30	17	56	34	11	60	23	11

TABLE-2

DEMOGRAPHIC DATA OF STROKE PATIENTS: (N = 30)

Characteristics	Values
Age (years)	40 – 50
Post stroke duration (days)	70 ± 85.3
Gender (male / female)	28(93.3%)2(6.7%)
Type of lesion (ischemic)	30(100%)
Hemi paretic side (Rt/Lt)	18(58%)12(42)

TABLE: 3

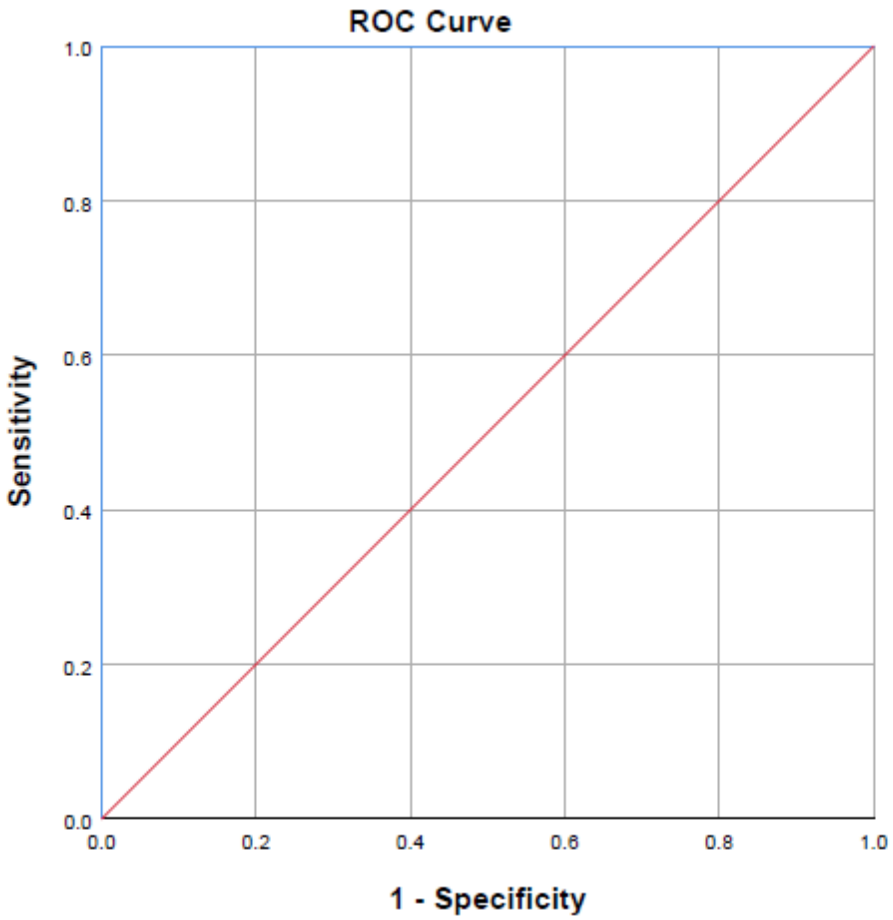
Pearson correlation coefficient values for CSFT and Berg Balance, Fugal Meyer lower extremity scale, time up and go test, Trunk Impairment Scale, functional reach test and Romberg test scores in stroke subjects:

Outcome measures	Pearson's correlation coefficient(r value)	Significance level (p)
CSFT and BBS	-.347	P > 0.05
CSFT and TUGT	.454	P < 0.05
CSFT and ROMBERG TEST	-.529	P < 0.01
CSFT and FRT	-.283	P > 0.05
CSFT and TIS	-.201	P > 0.05
CSFT AND FMLEIS	-.377	P < 0.05

Based on Table 3, A Pearson product-moment correlation analysis shows that there is a strong, negative correlation between cross step moving on four spot test to berg balance scale (r=-.347, p=0.10), time up and go test(r=.454,p=0.05),Romberg test(r=-.529,p=0.01), functional reach test(r=-.290,p=0.10),trunk impairment scale(r=-.201,p=0.10),fugal Meyer lower extremity impairment scale (r=-.377, p=0.05) , which is not statistically significant.

FIGURE- 1

Receiver operating characteristics curve by plotting correlation between cross step moving on four spot test and time up and go test cut off score of high risk fall and low risk fall in stroke patients.



Based on figure 1, ROC analysis, the area under the curve (AUC) was 1.000 , and the cut off value in cross step moving on four spot test to discriminate high and low fall risk patients was 12.5 sec with sensitivity 1.000 and specificity 0.864

CHAPTER - V

RESULTS AND DISSCUSSION

A total of 30 participants successfully completed all the seven tests involved in the study. using **Pearson's correlation** the relation between cross step moving on four spot test and fall related physical function is calculated the Relation between the cross step moving on four spot test and berg balance scale showed, (r = .347) (p= 0.10)the moderate correlated. Relation between the cross step moving on four spot test and fugal Meyer lower extremity impairment scale showed (r = .377) the correlation significant at p= 0.05 level. Relation between the cross step moving four spot test and functional reach test showed (r =.290) (p=0.10) the weakly correlated. Relation between cross step moving on four spot test and Romberg test showed r = -.529 the correlation significant at 0.01 level, Relation between cross step moving on four spot test and trunk impairment scale showed, (r = -.201)(p=0.10) the weakly correlated ,Relation between cross step moving on four spot test and time up and go test showed, (r = .454) the correlation significant at(p= 0.05) level

Using **ROC curve** to find the cut of score to identifying fall risk in stroke patients using cross step moving on four spot test and time up go test between, To find the cut off score between cross step moving on four spot test and time up and go test showed area under the curve valve is 1.000 it is a good valve and the fall risk cut off score in cross step moving on four spot test is 12.5 .therefore more than 12.5 score is high fall risk and less than 12.5 is low fall risk level.(sensitivity valve is 1.000 and specificity valve is 0.864).

The participants in this study lived independently in the community, did not use walking aids, And spent time outdoors at least one day every week. However, all participants in this study completed CSFT without physical aid, although some patients required additional trails because of mistake in the step sequence or loss of balance.[1] Although cross over steps may be difficult for the stroke patients, those who live independently should able to attempt the CSFT as well as often fall risk assessment scale or test.

SHUNSUKE YAMAJI et al., states that Rapid cross over stepping is considered to be important for avoiding falls. In cross over stepping the body position must change suddenly in an unstable direction, which rarely occurs under usual walking conditions. Difficult movements in addition to maintaining physical function (leg strength, balance and mobility) related to fall prevention are demanded of stroke participants for the CSFT to be successfully performed

SHINICHI DEMURA et al., states that many researchers have examined the relationship between falling, speed, and stability of gait in elderly individual. Kim et al., reported that elderly individuals with fall experience are more unstable in gait than those without such experience. Lee et al reported differences between groups with or without a previous fall in test, including a 2.45 m round trip walk, 10 m gait time, cadence and one leg standing. On other hand a, relationship between muscle strength and, balance and those between muscle strength and walking speed were poor. Physical function such as strength, balance and mobility reflect and Falls in stroke patients with chronic disabilities have been associated with poor balance, activities of daily living and cognitive deficits are risk factor for falls in stroke patients. .

SEUNGHEON AN et al., states that in patients stroke rehabilitation falls are frequently associated with impulsive behaviour, poor judgment, or calculated risk taking by patients. The lower extremity motor function of the affected side was the more possibility of experiencing falls increases for the stroke patients. It was noted that ability to normally adjust the trunk and the independent activities of daily living are impossible if the TIS was less than 20 points. The TIS of chronic stroke patients had a significant relationship with the balance subscale of POMA, gait, functional ambulation category, 10 WT, TUG, motor scale of the functional independence measure, TIS. Since there is a deficit of trunk control, the reduction of balance ability, slow gait speed, and low functional independent level are the largest problems among stroke patients, and these variables are closely related with falls. The factors appeared as sequences of the STS, OLS of the affected side, and number of falls, FM of the lower extremity and dynamic balance of the TIS. Balance has an interdependent relationship with the muscle strength of the lower extremity, dynamic balance, falls, motor function of the affected lower extremity and trunk adjusting ability.

Stroke communities have highlighted the difficulties of developing a single predictive tool owing to the wide range of factors associated with falls (e.g fall history, impaired balance, altered mood and cognition), relating to environmental status (living in the community, hospital or supported housing) and the problems with validating fall events. The other variable that stood out was the River mead upper limb score. These findings suggested that sign of instability from falling poor upper limb function were relate to most at risk of falls. Repeat fallers had worse upper limb function in comparison to non repeat fallers actually falling by using their arms.

PAO-TSAI CHENG et al., states that More than one third of falls in stroke patients occur while they are rising or sitting down, consequence of specific dysfunction, complex biomechanics underlying the performance of normal sit to stand. Dynamic postural balance characteristics during the way of rising / sitting down between healthy subjects and stroke patients is useful. Several condition may influence the dynamics of movement of the whole body during sit to stand transfer, such as subject age, variation in the speed rising, initial body position, and trunk flexion these factors are related to falls in stroke patients. Clinical experience suggested that body weight is usually distributed nearly symmetrically on the two legs when a healthy person rises or sits down, however body weight might be loaded more on one leg than the other if the person intends to move to the right or to the left after standing up. After stroke the patients usually use compensatory action of the uninvolved side, they spontaneously and constantly put more body weight on the non paretic leg when getting up from and sitting down on a chair. Engandt and associates the load on the paretic leg of stroke patients averaged 37% of body weight. Therefore the asymmetrical body weight distribution in stroke patients while rising and sitting down might be a contributing factor related to falls in stroke patients

MAY-KUEN WONG et al., states that decreased sensory output from the somatosensory, visual, and vestibular system as well as poor spatial integration, might contribute to postural abnormality patients with hemiplegic. Consequently stroke patients with impaired sensory ability may have a significant impact on fall risk. Studies noted that left hemiplegic patients and were at a much higher risk of falling. Since falls are so frequent in stroke patients, prevention strategies should therefore be developed and included in the rehabilitation program.

In study conducted by **ESTHER Y. et al.,** titled reliability and concurrent validity of four square step test scores in subjects with chronic stroke, they found that there will be loss of support and the participants were required to weight shift more laterally until the contra-lateral foot is lifted from floor.(single limb support phase)so this will lead to shift more weight either paretic or non paretic limb there by resulting in loss of stability resulting in stroke patients. In our present study the CSFT require more of complex clockwise and counter clockwise movement which will be difficult with stroke patient that was mention with above study. And also found that complex stepping sequence in the FSST is difficult for person with cognitive impairment .but in our present study cognitive level was more than 23 but the MMSE interpretation says that in stroke patients the value between 25- 30 has a significant degree of impairment and may have clinically significant but mild deficit likely to affect most demanding activities of daily living. So the CSFT require more of complex activity compare to normal ADL activities and also it is difficult for stroke patients.

In an article which was done to find the reliability and validity of STEP TEST score in subject with chronic stroke by **SZE – JIA HONG et al.,** found that there is a correlation between and step test and they found BBS mean was score 50.3 which shows there is correlation coefficient of .675 and they stated that this is due to closer relation between similar items in BBS and STEP TEST. In our present study the BBS was 50.5 which show that there is a satisfactory balance performance. But comparing to the above study the components of the CSFT does not match with a BBS items and so there is no correlation between BBS and CSFT.

In our present study fugl - Meyer lower extremity score mean value of 34 which is an higher score indicating lesser impairment. in a study conducted by **MANDI ML. Et al.,** who tried to evaluate reliability and validity of ALTERNATE STEP TEST times in subjects with chronic stroke patients found that in assessing reflexes , voluntary control of isolated movements and coordination are most common outcome measure of FMLE . In performing alternate step test patients requires more of coordination of the lower limb muscles of the paretic leg and smooth movements' sequence of hip flexion and knee flexion, extension components which involves more of cognition, But in our study the stroke patients have a MMSE value between 25 – 30 and so there exists a significant degree of impairment and may have clinically significant but mild

deficit likely to affect most demanding activities of daily living. So the CSFT require more of complex activity compare to normal ADL activities and also that it is most difficult for stroke patients to complete the CSFT even though with higher score of 34 indicating lesser impairment The result of the in this study says that using Pearson's correlation relation between the CSFT and fall related physical function is calculated between CSFT and berg balance scale showed(r= 0.347)(p= 0.10) moderately correlated, relation between CSFT and fugal Meyer lower extremity impairment scale showed(r= .377) (p= 0.05), CSFT and functional reach test showed r= 0.290 p=(0.10) weakly correlated, CSFT and Romberg test(r= .529) (p=0.01) significant correlated , CSFT and trunk impairment scale showed (r=.201) (p=0.10) weakly correlated , CSFT and time up go test showed(r=.201)correlation significant at level (p= 0.05) .

The **ROC** analysis in this study to identifying cut off value in the CSFT score of 12.5 seconds. Therefore >12.5 seconds high risk fall and < 12.5 seconds is low risk fall level (sensitivity value is 1.000) and (specificity value is 0.864). So in our study the stroke patients have a MMSE value between 25 and 30 and so there exists a significant degree of impairment and may have clinically significant but mild deficit likely to affect most demanding activities of daily living. So the CSFT require more of complex activity compare to normal ADL activities and also that it is most difficult for stroke patients to complete the CSFT.

LIMITATIONS:

- According to the result, the cross step moving on four spot test may not be valid tool to measure fall risk in stroke patients due to small sample size.
- Blinding was not done

SUGGESTIONS FOR FUTURE STUDY:

1. Future studies should examine the relationship between fall averting ability measure under simulated conditions and that measured using CSFT value.
2. Future studies should recommended with large sample size to measure the fall risk

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CHAPTER - VI

CONCLUSIONS AND SUMMARY

According to the result, the cross step moving on four spot test may not be valid tool to identify fall risk in stroke patients. And this, the cross step moving on four spot test is strongly correlated to limits of stability and somatosensory input, and moderately correlated to berg balance scale , fugal Meyer lower extremity impairment scale, and also with time up and go test, weakly correlated to functional reach test and trunk impairment scale.

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.ANNEXURE - I

PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee
Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

To
Mr D Sathiyaraji
II Year MPT
Guides: Mr R Mahesh / Mr J Raja Regan
PSG College of Physiotherapy
Coimbatore

Ref: Project No.17/156

Date: September 6, 2017

Dear Mr Sathiyaraji,

Institutional Human Ethics Committee, PSG IMS&R reviewed and discussed your application dated 26.04.2017 to conduct the research study entitled "*Cross step moving on four spot test - validity and its relation with fall related physical function in stroke patients*" during the IHEC meeting held on 19.05.2017.

The following documents were reviewed and approved:

1. Project submission form
2. Study protocol (Version 1 dated 26.04.2017)
3. Informed consent forms (Version 2 dated 05.09.2017)
4. Data Collection Tool (Version 2 dated 20.06.2017)
5. Permission letter from concerned Heads of Department
6. Current CVs of Principal investigator, Co-investigator
7. Budget

The following members of the Institutional Human Ethics Committee (IHEC) were present at the meeting held on 19.05.2017 at IHEC Secretariat, PSG IMS & R between 10.00 am and 11.00 am:

Sl. No.	Name of the Member of IHEC	Qualification	Area of Expertise	Gender	Affiliation to the Institution Yes/No	Present at the meeting Yes/No
1	Mr R Nandakumar (Chairperson, IHEC)	BA., BL	Legal Expert	Male	No	Yes
2	Dr. S. Bhuvaneshwari (Member-Secretary, IHEC)	MD	Clinical Pharmacology	Female	Yes	Yes
3	Dr S Shanthakumari	MD	Pathology, Ethicist	Female	Yes	Yes
4	Dr Sudha Ramalingam	MD	Epidemiologist, Ethicist Alt. member-Secretary	Female	Yes	Yes
5	Dr D Vijaya	M Sc., Ph D	Basic Medical Sciences (Biochemistry)	Female	Yes	Yes

The study is approved in its presented form. The decision was arrived at through consensus. Neither PI nor any of proposed study team members were present during the decision making of the IHEC. The IHEC functions in accordance with the ICH-GCP/ICMR/Schedule Y guidelines. The approval is valid until one year from the date of sanction. You may make a written request for renewal / extension of the validity, along with the submission of status report as decided by the IHEC.

PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee

Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

Following points must be noted:

1. IHEC should be informed of the date of initiation of the study
2. Status report of the study should be submitted to the IHEC every 12 months
3. PI and other investigators should co-operate fully with IHEC, who will monitor the trial from time to time
4. At the time of PI's retirement/intention to leave the institute, study responsibility should be transferred to a colleague after obtaining clearance from HOD, Status report, including accounts details should be submitted to IHEC and extramural sponsors
5. In case of any new information or any SAE, which could affect any study, must be informed to IHEC and sponsors. The PI should report SAEs occurred for IHEC approved studies within 7 days of the occurrence of the SAE. If the SAE is 'Death', the IHEC Secretariat will receive the SAE reporting form within 24 hours of the occurrence
6. In the event of any protocol amendments, IHEC must be informed and the amendments should be highlighted in clear terms as follows:
   a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)
   b. Alteration in the budgetary status should be clearly indicated and the revised budget form should be submitted
   c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval
   d. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented
   e. If there are any amendments in the trial design, these must be incorporated in the protocol, and other study documents. These revised documents should be submitted for approval of the IHEC and only then can they be implemented
   f. Any deviation-Violation/waiver in the protocol must be informed to the IHEC within the stipulated period for review
7. Final report along with summary of findings and presentations/publications if any on closure of the study should be submitted to IHEC

Kindly note this approval is subject to ratification in the forthcoming full board review meeting of the IHEC.

Thanking You,

Yours Sincerely,

SECRETARY
PSG IMS&R
COIMBATORE-641004.
INSTITUTIONAL HUMAN ETHICS COMMITTEE

Dr S Bhuvaneshwari
Member - Secretary
Institutional Human Ethics Committee

ANNEXURE II

NEUROLOGICAL ASSESSMENT FORM FOR STROKE

Medical Diagnosis:

Referred By:

Assessed by:

SUBJECTIVE EXAMINATION

DEMOGRAPHIC DATA

Name: OP No: IP No:

Age: Sex: Date:

Address:

Chief Complaints:

History of present illness:

RISK FACTORS

Past history of current condition:

Past medical and surgical History:

Personal History:

Family History:

Occupational History:

History of living environment:

Social History:

Previous functional status:

Pain History

Side :

Site :

Onset :

Duration :

Type :

Aggravating factors :

Relieving factors :

Severity :

Vital Signs

Temperature :

Blood pressure :

Heart rate :

Respiratory rate :

OBJECTIVE EXAMINATION

ON OBSERVATION

Built :

Posture :

Attitude of limbs :

Muscle wasting :

Pattern of movement :

Gait :

Pressure sore :

Edema :

Tropical changes :

External appliances :

On Palpation

Tone :

Edema :

Tenderness :

Warmth :

1. HIGHER MENTAL FUNCTIONS

Level of consciousness

Orientation

Person :

Place :

Time :

Memory

Immediate :

Recent :

Remote :

Attention :

Communication :

Emotional status :

2. HIGHER CORTICAL FUNCTIONS

Cognition:

Fund of knowledge :

Calculation :

Proverb interpretation :

Perception:

Body scheme/ body image disorders:

Spatial relation disorders :

Agnosias :

Apraxia :

3. CRANIAL NERVES

4. SENSORY SYSTEM

5. MOTOR SYSTEM

Muscle Tone:

Upper limb	Lower limb

Muscle Power:

Voluntary motor control:

	Right	Left
Upper limb		
Lower limb		

Muscle girth:

AREA	Rt(cms)	Lt(cms)
Arm		
Forearm		
Thigh		
Calf		

Movement time:

Associated Reactions:

6. REFLEXES:

Superficial:

Abdominal :

Plantar :

Deep:

JERKS	Rt	Lt
Biceps		
Brachio – radialis		
Triceps		
Knee		
Ankle		

Tonic Postural Reflexes:

7. INVOLUNTARY MOVEMENTS:

8. CO-ORDINATION

Non equilibrium test :

Equilibrium test :

9. BALANCE:

Balance	Static	Dynamic
Sitting		
Standing		

Centre of Gravity Control :

Balance Reactions :

Motor Strategies :

Sensory Strategies :

10. GAIT:

Bio mechanical deviations:

11. HAND FUNCTIONS:

Reaching :

Grasping :

Releasing :

12. ASSISTIVE DEVICES:

13. OTHER SYSTEMS:

Integumentary system :

Pressure sore :

Respiratory system :

Secretion :

Pattern of breathing :

Deformity :

Cardiovascular system:

Deep vein thrombosis :

Edema :

Musculoskeletal system:

Contracture :

Subluxation :

Stiffness :

Heterotopic ossification :

Osteoporosis :

Bladder and bowel function :

Gastro intestinal system :

Sexual function :

Autonomic system:

Vasomotor :

Pseudomotor :

Tropic changes :

Postural hypotension:

Reflex sympathetic dystrophy:

14. FUNCTIONAL STATUS:

Bed mobility:

Transfer:

PHYSICAL THERAPY DIAGNOSIS:

Direct impairments :

Indirect impairments :

Composite impairments :

Functional limitations :

PHYSICAL THERAPY MANAGEMENT:

ANNEXURE - III

DATA COLLECTION FORM

Patient Name :

Age :

Sex :

Occupation :

Address :

IP/ OP No :

Contact no :

Date of Assessment:

Diagnosis :

Post Stroke Duration:

OUTCOME MEASUREMENTS SCORING:

S.NO	OUTCOME MEASURES	TRIAL		AVG. SCORE
1	**Cross Step Moving On Four Spot Test**	I	II	
	SCALES	**SCORE**		
2	**Time Up Go Test**			
3	**Berg Balance Scale**			
4	**Fugl Meyer Assessment Lower Extremity**			
5	**Functional Reach Test**			
6	**Romberg Test**			
7	**Trunk Impairment Scale**			

Date:
Place:

Therapist Signature

ANNEXURE- IV

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH STUDY

PSG Institute of Medical Science and Research, Coimbatore
Institutional Human Ethics Committee
INFORMED CONSENT FORMAT FOR RESEARCH PROJECTS

I **sathiyaraji** carrying out a study on the topic: **"CROSS STEP MOVING ON FOUR SPOT TEST VALIDITY AND IT IS RELATION WITH FALL RELATED PHYSICAL FUNCTION IN STROKE PATIENTS''** as part of my research project being carried out under the aegis of the Department of Neurology & Physical Medicine and Rehabilitation.

My research guide is: PROF. Mahesh.R , PRINCIPAL, PSG College of Physiotherapy.

The justification for this study is: The risk of falls is very high among stroke patients, and falling is a major complication in strike rehabilitation. there is also an overrepresentation of patients with previous stroke among hip fractures patients , and reducing these risk should be an essential element in rehabilitation strategies and predicting fall risk in stroke patients in advance and taking necessary precaution are included in our rehabilitation goals. So accordingly studies have been performed to identifying potential fallers using various scale like fall efficacy scale ,stroke assessment of fall risk,Demura fall risk assessment, BBS, Mini-Best scale and tests like alternative step test ,choice stepping reaction test ,four square test etc . Cross steps moving on four spot test is a new test used in geriatrics and studies have shown that it is a reliable and valid test to identify the fall risk in elderly participants. This test is not yet use in stroke population for same purpose. Therefore there is need to do a study to find its validity as well as a to find what are the impairments post stroke are related to this identify fall risk

The objectives of this study:

1. To find the validity of cross steps moving on four spot test.
2. To find relation between cross steps moving on four spot test and fall related physical function.
3. To find the cut off score cross step moving on four spot test to identifying fall risk in stroke patients .

Sample size: 47

Study participants are stroke subjects, age group of 40-60years.

Location: Department of neurology and Department of PMR, PSG Hospitals.

We request you to kindly cooperate with us in this study. We propose collect background information and other relevant details related to this study. We will be carrying out:

Initial interview: 15 minutes.

Final interview: 15 minutes.

If **Photograph** taken, purpose: **yes, evidence for project purpose**

Data collected will be stored for a period of **2** years. **We will not use** the data as part of another study.

Health education sessions: number of sessions **1** approximate duration of each session: **15** minutes.

Clinical examination (specify details purpose): **Yes**

Blood sample collection: Not applicable

Specify quantity of blood being drawn**:**

No. of times it will be collected:

Whether blood sample collection is part of routine procedure or for research (study) purpose:

1. Routine procedure 2. Research purpose

Specify purpose, discomfort likely to be felt and side effects, if any:

Whether blood sample collected will be stored after study period: Yes / No, it will be destroyed

Whether blood sample collected will be sold: Yes/ No

Whether blood sample collected will be shared with persons from another institution: Yes/ No

Medication given, if any, duration, side effects, purpose, benefits:

Whether medication given is part of routine procedure: Yes / No (If not, state reasons for giving this medication)

Whether alternatives are available for medication given: Yes / No (If not, state reasons for giving this particular medication)

Data collected will be stored for a period of 2 years. We **will not use** the data as part of another study.

Benefits from this study : Based on the results , if the test prove to be valid, then this test can be used as a tool to identify fall risk in stroke patients. In future studies this test can be used as an outcome measure to find the change in fall risk.

Risks involved by participating in this study: There is no any risk for in this study

How the **results** will be used:

- Peer-reviewed scientific journals
- Conference presentation
- Internal report

The data collected during the study will be used without revealing your identity. Your identity will be confidential even if the results of the study are published.

If you are uncomfortable in answering any of our questions during the course of the interview, **you have the right to withdraw from the interview / study at anytime.** You have the freedom to withdraw from the study at any point of time. Kindly be assured that your refusal to participate or withdrawal at any stage, if you so decide, will not result in any form of compromise or discrimination in the services offered nor would it attract any penalty. You will continue to have access to the regular services offered to a patient. You will **NOT** be paid any remuneration for the time you spend with us for this interview / study. The information provided by you will be kept in strict confidence. Under no circumstances shall we reveal the identity of the respondent or their families to anyone. The information that we collect shall be used for approved research purposes only. You will be informed about any significant new findings - including adverse events, if any, – whether directly related to you or to other participants of this study, developed during the course of this research which may relate to your willingness to continue participation.

Consent: The above information regarding the study, has been read by me/ read to me, and has been explained to me by the investigator/s. Having understood the same, I hereby give my consent to them to interview me. I am affixing my signature / left thumb impression to indicate my consent and willingness to participate in this study (i.e., willingly abide by the project requirements).

Signature / Left thumb impression of the Study Volunteer / Legal Representative:

Signature of the Interviewer with date: Witness:

Contact number of PI: 7867997839

Contact number of Ethics Committee Office: 0422 4345818

பூ. சா. கோ மருத்துவக் கல்லூரி மற்றும் ஆராய்ச்சி நிறுவனம், கோவை

மனித நெறிமுறைக் குழு

ஒப்புதல் படிவம்

தேதி:

த. சத்தியராஜ் ஆகிய நான் பூசாகோ மருத்துவக் கல்லூரியின் / மருத்துவமனையின் நரம்பியல் துறையின் கீழ் **பக்கவாத நோயாளிகளில் நான்கு இடகுறுக்கு நகர்வு** (Cross Step moving on four spot test) **அளவீட்டை மதிப்பிடுதலும், நோயாளி உடல் செயல்பாட்டின் போது கீழே விழும் தன்மையில் அதன் பயன்பாடும்** என்ற தலைப்பில் ஆய்வு மேற்கொள்ள உள்ளேன்.

என் ஆய்வு வழிகாட்டி: பேராசிரியர் திரு. ரா. மகேஷ், முதல்வர், பூசாகோ பிசியோதெரபி கல்லூரி

ஆய்வு மேற்கொள்வதற்கான அடிப்படை:

நான்கு இடகுறுக்கு நகர்வு சோதனையானது வயதானவர்களில் உடல் செயல்பாட்டின் போது கீழே விழும் தன்மையில் அதன் பயன்பாட்டின் அளவீட்டை மதிப்பிட்டுள்ளனர். ஆனால் பக்கவாத நோயாளிகளில் இந்த நான்கு இடகுறுக்கு நகர்வு சோதனையின் அளவீட்டை பக்கவாத நோயாளிகளில் அதன் பயன்பாட்டின் மதிப்பீடுகளை கண்டறியப்படவில்லை ஆகையால் இந்த ஆய்வு மேற்கொள்ளப்படுகிறது மற்றும் இந்த புதிய சோதனையையும் மற்ற உடல் செயல்பாட்டின் தொடர்பான சோதனைகளையும் ஒப்பிட்டு பார்த்து அவைகளின் மதிப்புகளுக்கு இடையேயான உறவு மதிப்பீடு செய்யப்படுகிறது.

ஆஉவின் நோக்கம்:

1. நான்கு இடகுறுக்கு நகர்வு சோதனையின் அளவீட்டை மதிப்பிடுதல்.
2. நான்கு இடகுறுக்கு நகர்வு சோதனை மற்றும் உடல் செயல்பாட்டின் போது கீழே விழும் தன்மையில் அதன் பயன்பாட்டிற்கும் இடையே உள்ள உறவுகளை மதிப்பிடுதல்.
3. பக்கவாத நோயாளிகளின் உடல் செயல்பாட்டின் போது கீழே விழும் தன்மையில் அதன் பயன்பாடு மற்றும் அளவீட்டின் மதிப்புகள் கண்டறிதல்.

ஆய்வில் பங்கு பெறும் நபர்களின் எண்ணிக்கை: 47

ஆய்வில் பங்கு பெறுவோர் மற்றும் வயது: 40-50 வயதுக்குட்பட்ட பக்கவாத நோயாளிகள், யார் உதவியும் இல்லாமல் தானே நடப்போர்.

ஆய்வு மேற்கொள்ளும் இடம்: நரம்பியல் துறை, புனர்வாழ்வு துறை மற்றும் பூசாகோ மருத்துவமனை, கோயம்புத்தூர்.

இந்த ஆய்வில் எங்களுடன் ஒத்துழைக்குமாறு கேட்டுக்கொள்கிறோம். நாங்கள் சில தகவல்களை இந்த ஆய்விற்காக சேகரிக்க உள்ளேன்.

ஆய்வு செய்யப்படும் முறை:

இந்த ஆய்வின் மொத்த கால அளவு 8 மாதங்கள், முதல் வருகையின் போது துவக்க நிலை ஆய்வு செய்த பிறகு ஆய்வினுள் சேர்க்கப்படுவர். பிறகு குறுக்கு படி நான்கு இடம் சோதனையின் உதவியோடு அதனுடைய காலம் கண்டறியப்பட்டு அதன் பிறகு மற்ற சோதனைகளின் காலமும் கண்டறியப்படும்.

முதன்மை நேர்காணல்: சோதனை செய்து முடிக்கும் நேரம் வரை எடுத்துக்கொள்ளும் நேரம் 15 நிமிடம்.

இந்த ஆய்வில் கிடைக்கும் தகவல்கள் **5 வருடங்கள்** பாதுகாக்கப்படும். இந்த தகவல்கள் வேறு ஆய்விற்குப் பயன்படுத்தப் பட மாட்டாது.

சுகாதாரக் கல்வி: அமர்வுகள்: ___ முறை ஒரு அமர்வுக்கான நேரம்: ___ நிமிடங்கள்

மருத்துவ பரிசோதனைகள்: உள்ளது

இரத்த மாதிரி சேகரிப்பு: _____ மிலி _____ முறை **பொருந்தாது**

இரத்த மாதிரி எடுப்பது வழக்கமான சிகிச்சைக்காகவோ அல்லது இந்த ஆய்விற்காகவோ:

பொருந்தாது

இரத்த மாதிரிகள் ஆய்விற்குப் பின் பாதுகாத்து வைக்கப்படுமா? ஆம் / இல்லை, அழிக்கப்படும்: **பொருந்தாது**

சேகரிக்கப்பட்ட இரத்தம் விற்கப்படுமா? ஆம் / இல்லை **பொருந்தாது**

சேகரிக்கப்பட்ட இரத்தம் வேறு நிறுவனத்துடன் பகிர்ந்து கொள்ளப்படுமா? ஆம் / இல்லை: **பொருந்தாது**

மருந்துகள் ஏதேனும் கொடுக்கப்படவிருந்தால் அவை பற்றிய விவரம் (கொடுக்கப்படும் காரணம், காலம், பக்க விளைவுகள், பயன்கள்): **பொருந்தாது**

மருந்துகள் கொடுக்கப்படுவது வழக்கமான சிகிச்சை முறையா?: ஆம் / இல்லை (இல்லை என்றால் கொடுக்கப்படும் காரணம்) **பொருந்தாது**

கொடுக்கப்படும் மருந்துகளுக்கு மாற்று உள்ளதா?: ஆம் / இல்லை (ஆம் என்றால் இந்த குறிப்பிட்ட மருந்து கொடுக்கப்படும் காரணம்) **பொருந்தாது**

ஆய்வில் பங்குபெறுவதால் ஏற்படும் பலன்கள்:

நான்கு இடம் குறுக்கு படி சோதனை. இது முதியோர்களுக்கு பயன்படுத்தப்பட்டது மற்றும் பல ஆய்வுகள் இந்த சோதனை ஒரு நம்பகமான ஆய்வுகள் என தெரிவித்திருக்கின்றன.. ஆனால் இந்த சோதனை இதுவரை பக்கவாத நோயாளிகளுக்கு பயன்படுத்தவில்லை. எனவே இந்த சோதனை பக்கவாத நோயாளிகளின் கீழே விழுதல் சுலபமாக கண்டறிய தேவைப்படுகிறது மற்றும் நம்பகமானதா என வீழ்ச்சி தொடர்பான செயல் பாடுகளையும் கண்டறியப்படுகிறது.

ஆய்வினால் ஏற்படக் கூடிய அசௌகரியங்கள் / பக்க விளைவுகள்: நான்கு இடகுறுக்கு நகர்வு சோதனையானது பெரியவர்களுக்கு கீழே விழுதல் பற்றி ஆய்வுகள் மேற்கொண்டுள்ளனர். ஆனால் இந்த நான்கு இடகுறுக்கு நகர்வு சோதனை பக்கவாத நொயாளிகளுக்கு பயன்படுத்தி இதுவரை ஆய்வுகள் மேற்கொள்ளவில்லை. எனவே, இந்த சோதனை செய்யப்படும்போது எவ்வித பக்கவிளைவுகளும் ஏற்படாது. மேலும், சோதனை செய்யும்போது பக்கவாட்டில் சுற்றிலும் பஞ்சு மெத்தை அமைக்கப்பட்டிருக்கும் மற்றும் ஆய்வாளர் பக்கவாட்டில் இருப்பார்.

ஆய்வின் முடிவுகள் எந்த முறையில் பயன்படுத்தப்படும்?

ஆய்வின் போது சேகரிக்கப்பட்ட உங்கள் அடையாளத்தை வெளிப்படுத்தாமல் பயன்படுத்தப்படும். ஆய்வின் முடிவுகள் வெளிட்யிடப்பட்டாலும் தங்கள் அடையாளம் இரகசியமாக வைக்கப்படும்.

இந்த ஆய்வின் கேள்விகளுக்கு பதிலளிப்பதோ, இரத்த மாதிரிகள் அல்லது திசு மாதிரிகள் எடுப்பதிலோ உங்களுக்கு ஏதேனும் அசௌகரியங்கள் இருந்தால், எந்த நேரத்தில் வேண்டுமானாலும் ஆய்விலிருந்து விலகிக்கொள்ளும் உரிமை உங்களுக்கு உண்டு. ஆய்விலிருந்து விலகிக்கொள்வதால் உங்களுக்கு

அளிக்கப்படும் சிகிச்சை முறையில் எந்த வித பாதிப்பும் இருக்காது என்று உங்களுக்கு உறுதியளிக்கிறோம். மருத்துவ மனையில் நோயாளிகளுக்கு அளிக்கப்படும் சேவைகளை நீங்கள் தொடர்ந்து பெறலாம். இந்த ஆய்வில் பங்கேற்க ஒப்புக்கொள்ளுவதால் வேறு எந்த விதமான கூடுதலான பலனும் உங்களுக்குக் கிடைக்காது. நீங்கள் அளிக்கும் தகவல்கள் இரகசியமாக வைக்கப்படும். ஆய்வில் பங்கேற்பவர்கள் பற்றியோ அவர்கள் குடும்பத்தைப் பற்றியோ எந்தத் தகவலும் எக்காரணம் கொண்டும் வெளியிடப்படாது என்று உறுதியளிக்கிறோம். நீங்கள் அளிக்கும் தகவல்கள் / இரத்த மாதிரிகள் / திசு மாதிரிகள் அங்கீகரிக்கப்பட்ட ஆய்விற்கு மட்டுமே பயன்படுத்தப்படும். இந்த ஆய்வு நடைபெறும் காலத்தில் குறிப்பிடத்தகுந்த புதிய கண்டுபிடிப்புகள் அல்லது பக்க விளைவுகள் ஏதும் ஏற்பட்டால் உங்களுக்குத் தெரிவிக்கப்படும். இதனால் ஆய்வில் தொடர்ந்து பங்கு பெறுவது பற்றிய உங்கள் நிலைப்பாட்டை நீங்கள் தெரிவிக்க ஏதுவாகும்.

ஆய்வுக்குட்படுபவரின் ஒப்புதல்: இந்த ஆய்வைப் பற்றிய மேற்கூறிய தகவல்களை நான் படித்து அறிந்து கொண்டேன் / ஆய்வாளர் படிக்கக் கேட்டுத் தெரிந்து கொண்டேன். ஆய்வினைப் பற்றி நன்றாகப் புரிந்து கொண்டு இந்த ஆய்வில் பங்கு பெற ஒப்புக்கொள்கிறேன். இந்த ஆய்வில் பங்கேற்பதற்கான எனது ஒப்புதலை கீழே கையொப்பமிட்டு / கை ரேகை பதித்து நான் தெரிவித்துக் கொள்கிறேன்.

பங்கேற்பாளரின் பெயர், முகவரி:

பங்கேற்பாளரின் கையொப்பம் / கை ரேகை / சட்டப்பூர்வ பிரதிநிதியின் கையொப்பம்:

தேதி :

ஆய்வாளரின் கையொப்பம்:

தேதி :

ஆய்வாளரின் தொலைபேசி எண்: 7867997839

மனித நெறிமுறைக் குழு அலுவலகத்தின் தொலைபேசி எண்:

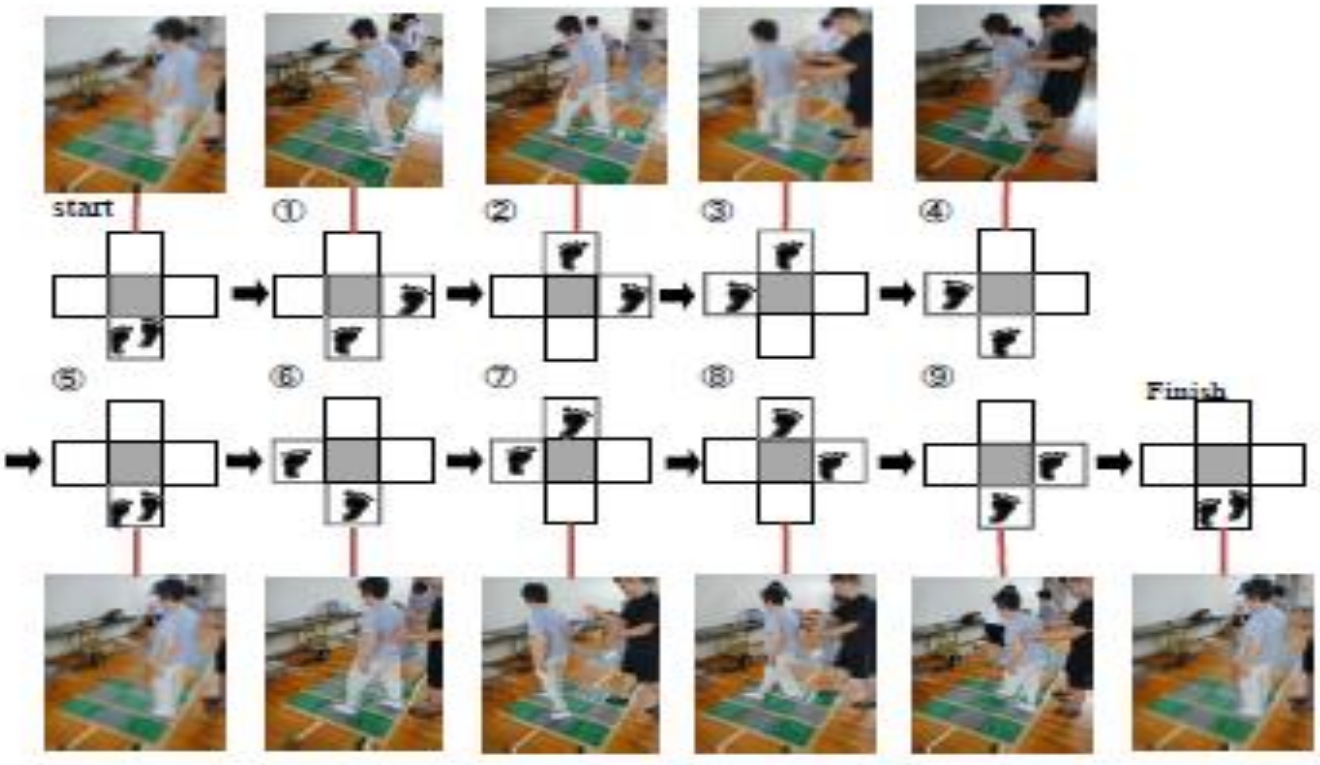
அலுவலக நேரத்தில் 0422 2570170 Extn.: 5818

ANNEXURE- V

ASSESSMENT TOOLS

CROSS STEP MOVING ON FOUR SPOT TEST

The sheets were set in a cruciform pattern with an empty center position. Participants stood in square number 1 facing square number 3 as . 1 as follows 2, 3,4,1,4,3,2and 1.this sequence required each participant to complete two rounds –one counter clockwise and clockwise. Participants were allowed a practice trial to ensure complete understanding of the step sequences and performed twice with a 3-min and interval for rest . the total time to complete all the steps was measured. The round was repeated if a participant failed to complete the sequence successfully, stepped off the sheet or lost balance.



BERG BALANCE SCALE:

The Berg Balance Scale (BBS) was developed to measure balance among older people with impairment in balance function by assessing the performance of functional tasks. It is a valid instrument used for evaluation of the effectiveness of interventions and for quantitative descriptions of function in clinical practice and research. The BBS has been evaluated in several reliability studies. A recent study of the BBS, which was completed in Finland, indicates that a change

of eight (8) BBS points is required to reveal a genuine change in function between two assessments

among older people who are dependent in ADL and living in residential care facilities.

Description:

14-item scale designed to measure balance of the older adult in a clinical setting.

Equipment needed: Ruler, two standard chairs (one with arm rests, one without),

footstool or step, stopwatch or wristwatch, 15 ft walkway

Completion:

Time: 15-20 minutes

Scoring: A five-point scale, ranging from 0-4. "0" indicates the lowest level

of function and "4" the highest level of function**.**

Total Score = 56

Interpretation:

41-56 = low fall risk

21-40 = medium fall risk

0 –20 = high fall risk

A change of 8 points is required to reveal a genuine change in function between 2 assessments.

Berg Balance Scale

Name: _____ Date: _____

Location: _____ Rater: _____

ITEM DESCRIPTION SCORE (0-4)

Sitting to standing _____

Standing unsupported _____

Sitting unsupported _____

Standing to sitting _____

Transfers _____

Standing with eyes closed _____

Standing with feet together _____

Reaching forward with outstretched arm _____

Retrieving object from floor _____

Turning to look behind _____

Turning 360 degrees _____

Placing alternate foot on stool _____

Standing with one foot in front _____

Standing on one foot _____

Total _____

GENERAL INSTRUCTIONS

Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

• the time or distance requirements are not met

• the subject's performance warrants supervision

• the subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

Berg Balance Scale

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

( ) 4 able to stand without using hands and stabilize independently

( ) 3 able to stand independently using hands

( ) 2 able to stand using hands after several tries

( ) 1 needs minimal aid to stand or stabilize

( ) 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

IN**STRUCTIONS**: Please stand for two minutes without holding on.

( ) 4 able to stand safely for 2 minutes

( ) 3 able to stand 2 minutes with supervision

( ) 2 able to stand 30 seconds unsupported

( ) 1 needs several tries to stand 30 seconds unsupported

( ) 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

( ) 4 able to sit safely and securely for 2 minutes

( ) 3 able to sit 2 minutes under supervision

( ) 2 able to able to sit 30 seconds

( ) 1 able to sit 10 seconds

( ) 0 unable to sit without support 10 seconds

STANDING TO SITTING

INSTRUCTIONS: Please sit down.

( ) 4 sits safely with minimal use of hands

( ) 3 controls descent by using hands

( ) 2 uses back of legs against chair to control descent

( ) 1 sits independently but has uncontrolled descent

( ) 0 needs assist to sit

TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way
toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4 able to transfer safely with minor use of hands

( ) 3 able to transfer safely definite need of hands

( ) 2 able to transfer with verbal cuing and/or supervision

( ) 1 needs one person to assist

( ) 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

( ) 4 able to stand 10 seconds safely

( ) 3 able to stand 10 seconds with supervision

( ) 2 able to stand 3 seconds

( ) 1 unable to keep eyes closed 3 seconds but stays safely

( ) 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

( ) 4 able to place feet together independently and stand 1 minute safely

( ) 3 able to place feet together independently and stand 1 minute with supervision

( ) 2 able to place feet together independently but unable to hold for 30 seconds

( ) 1 needs help to attain position but able to stand 15 seconds feet together

( ) 0 needs help to attain position and unable to hold for 15 seconds

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at
the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is
the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use

both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)

( ) 3 can reach forward 12 cm (5 inches)

( ) 2 can reach forward 5 cm (2 inches)

( ) 1 reaches forward but needs supervision

( ) 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is in front of your feet.

( ) 4 able to pick up slipper safely and easily

( ) 3 able to pick up slipper but needs supervision

( ) 2 unable to pick up but reaches 2-5 cm(1-2 inches) from slipper and keeps balance independently

( ) 1 unable to pick up and needs supervision while trying

( ) 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. (Examiner may pick an object

to look at directly behind the subject to encourage a better twist turn.)

( ) 4 looks behind from both sides and weight shifts well

( ) 3 looks behind one side only other side shows less weight shift

( ) 2 turns sideways only but maintains balance

( ) 1 needs supervision when turning

( ) 0 needs assist to keep from losing balance or falling

TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less

( ) 2 able to turn 360 degrees safely but slowly

( ) 1 needs close supervision or verbal cuing

( ) 0 needs assistance while turning

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complete > 2 steps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place

your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To

score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the

subject's normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds

( ) 3 able to place foot ahead independently and hold 30 seconds

( ) 2 able to take small step independently and hold 30 seconds

( ) 1 needs help to step but can hold 15 seconds

( ) 0 loses balance while stepping or standing

STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds

( ) 3 able to lift leg independently and hold 5-10 seconds

( ) 2 able to lift leg independently and hold L 3 seconds

( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.

( ) 0 unable to try of needs assist to prevent fall

( ) TOTAL SCORE (Maximum = 56)

TIME UP AND GO TEST:

The timed up and go test is a simple test used to assess a person's mobility and requires both static and dynamic balance it uses the time that a person takes to rise from a chair, walk three meters, turn around, walk back to the chair, and sit down .

TRUNK IMPAIRMENT SCALE:

The starting position for each item is the same. The patient is sitting on the edge of a bed or treatment table without back and arm support. The thighs make full contact with the bed or table, the feet are hip width apart and placed flat on the floor. The knee angle is 90°. The arms rest on the legs. If hypertonia is present the position of the hemiplegic arm is taken as the starting position. The head and trunk are in a midline position.
If the patient scores 0 on the first item, the total score for the TIS is 0.
Each item of the test can be performed three times. The highest score counts. No practice session is allowed.
The patient can be corrected between the attempts.
The tests are verbally explained to the patient and can be demonstrated if needed.

Item			
	Static sitting balance		
1	Starting position	Patient falls or cannot maintain starting position for 10 seconds without arm support	☐ 0
		Patient can maintain starting position for 10 seconds	☐ 2
		If score = 0, then TIS total score = 0	
2	Starting position Therapist crosses the unaffected leg over the hemiplegic leg	Patient falls or cannot maintain sitting position for 10 seconds without arm support	☐ 0
		Patient can maintain sitting position for 10 seconds	☐ 2
3	Starting position Patient crosses the unaffected leg over the hemiplegic leg	Patient falls	☐ 0
		Patient cannot cross the legs without arm support on bed or table	☐ 1
		Patient crosses the legs but displaces the trunk more than 10 cm backwards or assists crossing with the hand	☐ 2
		Patient crosses the legs without trunk displacement or assistance	☐ 3
		Total static sitting balance	/7
	Dynamic sitting balance		
1	Starting position Patient is instructed to touch the bed or table with the hemiplegic elbow (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table	☐ 0
		Patient moves actively without help, elbow touches bed or table	☐ 1
		If score = 0, then items 2 and 3 score 0	
2	Repeat item 1	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening	☐ 1
		If score = 0, then item 3 scores 0	
3	Repeat item 1	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet	☐ 0
		Patient moves without compensation	☐ 1
4	Starting position Patient is instructed to touch the bed or table with the unaffected elbow (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table	☐ 0
		Patient moves actively without help, elbow touches bed or table	☐ 1
		If score = 0, then items 5 and 6 score 0	
5	Repeat item 4	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening	☐ 1
		If score = 0, then item 6 scores 0	

Item			
6	Repeat item 4	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet	☐ 0
		Patient moves without compensation	☐ 1
7	Starting position Patient is instructed to lift pelvis from bed or table at the hemiplegic side (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening If score = 0, then item 8 scores 0	☐ 1
8	Repeat item 7	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) pushing off with the ipsilateral foot (heel loses contact with the floor)	☐ 0
		Patient moves without compensation	☐ 1
9	Starting position Patient is instructed to lift pelvis from bed or table at the unaffected side (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening If score = 0, then item 10 scores 0	☐ 1
10	Repeat item 9	Patient compensates. Possible compensations are: (1) use of upper extremities, (2) pushing off with the ipsilateral foot (heel loses contact with the floor)	☐ 0
		Patient moves without compensation	☐ 1
		Total dynamic sitting balance	/10
	Co-ordination		
1	Starting position Patient is instructed to rotate upper trunk 6 times (every shoulder should be moved forward 3 times), first side that moves must be hemiplegic side, head should be fixated in starting position	Hemiplegic side is not moved three times	☐ 0
		Rotation is asymmetrical	☐ 1
		Rotation is symmetrical If score = 0, then item 2 scores 0	☐ 2
2	Repeat item 1 within 6 seconds	Rotation is asymmetrical	☐ 0
		Rotation is symmetrical	☐ 1
3	Starting position Patient is instructed to rotate lower trunk 6 times (every knee should be moved forward 3 times), first side that moves must be hemiplegic side, upper trunk should be fixated in starting position	Hemiplegic side is not moved three times	☐ 0
		Rotation is asymmetrical	☐ 1
		Rotation is symmetrical If score = 0, then item 4 scores 0	☐ 2
4	Repeat item 3 within 6 seconds	Rotation is asymmetrical	☐ 0
		Rotation is symmetrical	☐ 1
		Total co-ordination	/6
		Total Trunk Impairment Scale	/23

FUNCTIONAL REACH TEST:

General Information: The Functional Reach test can be administered while the patient is standing (Functional Reach) or sitting (Modified Functional Reach).

Functional Reach (standing instructions):

The patient is instructed to next to, but not touching, a wall and position the arm that is closer to the wall at 90 degrees of shoulder flexion with a closed fist. The assessor records the starting position at the 3rd metacarpal head on the yardstick. Instruct the patient to "Reach as far as you can forward without taking a step." The location of the 3rd metacarpal is recorded. Scores are determined by assessing the difference between the start and end position is the reach distance, usually measured in inches. Three trials are done and the average of the last two is noted.

Set-up:

A yardstick and duck tap will be needed for the assessment. The yardstick should be affixed to the wall at the level of the patient's acromion.

ROMBERG TEST:

The Romberg test and sharpened Romberg test are tests of static balance that measure the ability to maintain balance with a narrowed base of support. This test is performed with feet together and eyes closed for 60 seconds. Timing starts after the subject has assumed the proper position and is stopped if the subject move his or her from the proper position, opens his or her eyes on the eyes closed trails, or when the maximum balance time of 60 seconds is reached. Subjects may be given assistance to assume the test position. Up to three trails may be performed if the maximum balance time is not reached in either of the first 2 trails. Upper extremity use is not controlled during test.

ABSTRACT

CROSS STEP MOVING ON FOUR SPOT TEST- VALIDITY AND IT IS RELATION WITH FALL RELATED PHYSICAL FUNCTION IN STROKE PATIENTS

BACKGROUND OF THE STUDY: The risk of falls is very high among stroke patients, and falling is a major complication in stroke rehabilitation. There is also an overrepresentation of patients with previous strokes among hip fractures patients, and reducing these risk should be an essential element in rehabilitation strategies and predicting fall risk in stroke patients in advance and taking necessary precaution are included in our rehabilitation goals. So accordingly studies have been performed to identify potential fallers using various scales like fall efficacy scale, stroke assessment of fall risk, Demura fall risk assessment, BBS, mini-Best scale and tests like alternative step test, choice stepping reaction test, four square test etc**..**

OBJECTIVE: To find the validity of Cross step moving on four spot test and the relation between cross step moving on four spot test and fall related physical function. To find the cut off score to identifying fall risk in stroke patients using cross step moving on spot test and berg balance scale.

STUDY DESIGN: cross sectional study

STUDY SETTING: department of neurology and department of PMR in stroke rehabilitation centre, PSG hospitals, Coimbatore.

PARTICIPANTS: 30 hemi paretic patients

INTERVENTION: not applicable.

STUDY PROCEDURE: Patient will be assessed for eligibility based on the inclusion and exclusion criteria. The informed consent will be obtained from the eligible patient. Each patient will be tested with all the outcome measures used in this study in random order. Adequate rest period will be given between the tests. Data will be collected and analysed.

OUTCOME MEASURES: Cross step moving on four spot test ,Berg balance scale, Timed up and go test, Fugal Meyer lower extremity motor impairment scale ,Trunk impairment scale, Functional reach test, and Romberg test

RESULT OF THE STUDY: Using **Pearson's correlation** the relation between cross step moving on four spot test and fall related physical function is calculated relation between , the cross step moving on four spot test and berg balance scale showed, (r = -.-347),(p = 0.10)Relation between the cross step moving on four spot test and fugal Meyer lower extremity impairment scale showed , (r = -.377) the correlation significant at (p= 0.05) level .Relation between the cross step moving four spot test and functional reach test showed , r =-.290 .Relation between cross step moving on four spot test and Romberg test showed(r = -.529) the correlation significant at(p= 0.05) level . Relation between cross step moving on four spot test and trunk impairment scale showed , r = -.201(p = 0.10)Relation between cross step moving on four spot test and time up and go test showed , (r = .454)the correlation significant at(p=0.05 level).Using **ROC**, To find the cut off score between cross step moving on four spot test and time up and go test showed area under the curve valve is 1.000 it is a good valve and the fall risk cut off score in cross step moving on four spot test is 12.5 .therefore more than 12.5 score is high fall risk and less than 12.5 is low fall risk level.(sensitivity valve is 1.000 and specificity valve is 0.864).

CONCLUSION: According to the result, the cross step moving on four spot test may not be validate tool to identify fall risk in stroke patients. And this the cross step moving on four spot test is strongly correlated to Romberg test, and moderately correlated to berg balance scale , fugal Meyer lower extremity impairment scale, and also with time up and go test, weakly correlated to functional reach test and trunk impairment scale

Keywords: CSFT, postural balance, physical function, stroke.